AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

Claims 1-15 (canceled)

16. (previously presented): An apparatus for generating optical pulses, wherein each pulse may have individualized characteristics, the apparatus comprising:

laser means, for generating bursts of composite pulses, and for amplifying said composite pulses in a same fiber amplifier gain medium, wherein said laser means is configured so that each of said pulses are incident on said same fiber laser gain medium and emitted from the same fiber gain medium along a common optical path;

control means that controls the laser means; and

beam manipulation means for monitoring the pulsewidth characteristics of the pulses comprising the composite pulse bursts and generating feedback data for the control means for pulsewidth control, the beam manipulating means comprising: a telescopic optical device to control the size, shape, divergence or polarization of the laser pulses input into the beam manipulation means, and steering optics that control an impingement location of the laser pulses on the target substrate.

17. (original): An apparatus as claimed in claim 16, wherein the laser means comprises a fiber amplifier.

18. (previously presented): An apparatus as claimed in claim 17, wherein the laser means further comprise at least one stretcher grating and at least one compressor.

19. (original): The apparatus as claimed in claim 16, wherein the beam manipulation means comprise an optical gating device that measures the pulse duration of the laser pulses.

20. (original): The apparatus as claimed in claim 19, wherein the beam manipulation means further comprise:

a power meter that measures the power of the laser pulses output from the laser means; and

a photodiode that measures a repetition rate of the laser pulses.

21. (original): The apparatus as claimed in claim 16, wherein the beam manipulation means comprise means for optically converting the fundamental frequency of a percentage of the generated laser pulses to one or more other optical frequencies.

22. (original): The apparatus as claimed in claim 21, the means for converting an optical frequency comprising at least one optical member that converts a portion of the fundamental of the laser pulses into at least one higher order harmonic signal.

23. (original): The apparatus as claimed in claim 22, wherein the optical member device comprises at least one non-linear crystal device with a controller that controls the orientation of the at least one non-linear crystal with respect to the input laser pulses.

24. (original): The apparatus as claimed in claim 21, wherein the means for converting an optical frequency further comprise a spectrometer that measures predetermined parameters of pulses output from the non-linear crystal device and generates feedback for the control means.

Claim 25 (canceled)

26. (original): The apparatus as claimed in claim 16, the apparatus further comprising a beam profiler that monitors characteristics of laser pulses and generates feedback for the control means.

27. (original): An end use device for modifying the refractive index of a target substrate, wherein the end device at least comprises an apparatus according to claim 16.

28. (original): An end use device for surface marking, sub-surface marking and surface texturing of a target substrate, wherein the end device at least comprises an apparatus according to claim 16.

29. (original): An end use device for fabricating holes, channels or vias in a target substrate, wherein the end device at least comprises an apparatus according to claim 16.

30. (original): An end use device for the deposition or removal of thin layers of material on a target substrate, wherein the end device comprises an apparatus according to claim 16.

31. (original): An end use device for the joining, welding or fusing of transparent materials, wherein the end device comprises an apparatus according to claim 16.

Claims 32-47 (canceled).

48. (previously presented): An apparatus for generating optical pulses, wherein each pulse may have individualized characteristics, the apparatus comprising:

laser means, for generating bursts of composite pulses, and for amplifying said composite pulses in a same fiber amplifier gain medium, wherein said laser means is configured so that each of said pulses are incident on said same fiber laser gain medium and emitted from the same fiber gain medium along a common optical path;

control means that controls the laser means; and

beam manipulation means for monitoring a variable repetition rate of the composite pulse bursts and generating feedback data for the control means for the variable repetition rate, the beam manipulating means comprising: a telescopic optical device to control the size, shape, divergence or polarization of the laser pulses input into the beam manipulation means, and steering optics that control an impingement location of the laser pulses on the target substrate.

49. (original): An apparatus as claimed in claim 48, wherein the laser means comprises a fiber amplifier.

50. (previously presented): An apparatus as claimed in claim 49, wherein the laser means further comprise at least one stretcher grating and at least one compressor.

51. (original): The apparatus as claimed in claim 48, wherein the beam manipulation means comprise a photodiode that measures a repetition rate of the laser pulses.

52. (original): The apparatus as claimed in claim 51, wherein the beam manipulation means comprise:

a power meter that measures the power of the laser pulses output from the laser means; and

an optical gating device that measures the pulse duration of the laser pulses.

53. (original): The apparatus as claimed in claim 48, wherein the beam manipulation means comprise means for optically converting the fundamental frequency of a percentage of the generated laser pulses to one or more other optical frequencies.

54. (original): The apparatus as claimed in claim 53, the means for converting an optical frequency comprising at least one optical member that converts a portion of the fundamental of the laser pulses into at least one higher order harmonic signal.

55. (original): The apparatus as claimed in claim 54, wherein the optical member device comprises at least one non-linear crystal device with a controller that controls the orientation of the at least one non-linear crystal with respect to the input laser pulses.

56. (original): The apparatus as claimed in claim 53, wherein the means for converting an optical frequency further comprise a spectrometer that measures predetermined parameters of pulses output from the non-linear crystal device and generates feedback for the control means.

Claim 57 (canceled)

58. (previously presented): The apparatus as claimed in claim 48, the apparatus further comprising a beam profiler that monitors characteristics of laser pulses and generates feedback for the control means.

59. (original): An end use device for modifying the refractive index of a target substrate, wherein the end device at least comprises an apparatus according to claim 48.

60. (original): An end use device for surface marking, sub-surface marking and surface texturing of a target substrate, wherein the end device at least comprises an apparatus according to claim 48.

61. (original): An end use device for fabricating holes, channels or vias in a target substrate, wherein the end device at least comprises an apparatus according to claim 48.

62. (original): An end use device for the deposition or removal of thin layers of material on a target substrate, wherein the end device comprises an apparatus according to claim 48.

63. (original): An end use device for the joining, welding or fusing of transparent materials, wherein the end device comprises an apparatus according to claim 48.

Claims 64-116 (canceled)

117. (previously presented): The apparatus as claimed in claim 16, wherein said laser means comprises a pulse source and a modulator disposed between said source and said amplifier.

118. (previously presented) The apparatus as claimed in claim 117, wherein said source produces pulse widths in the range of femtoseconds to picoseconds.

119. (previously presented): The apparatus as claimed in claim 16, wherein said composite pulses within said burst comprise at least one of time separation, a different pulse width, a different peak power, a different wavelength, and a different polarization.

120. (previously presented): The apparatus as claimed in claim 16, wherein said beam manipulation means produces a beam at a fundamental frequency, at least one harmonic beam at a multiple of said fundamental frequency, and is configured to transmit information for diagnostics from said beam manipulation means to said control means.

121. (previously presented): An apparatus for generating optical pulses, wherein each pulse may have individualized characteristics, the apparatus comprising:

laser means, for generating bursts of composite pulses, and for amplifying said composite pulses in a same fiber amplifier gain medium, wherein said laser means is configured so that each of said pulses are incident on said same fiber laser gain medium and emitted from the same fiber gain medium along a common optical path;

control means that controls the laser means; and

beam manipulation means for monitoring the pulsewidth characteristics of the pulses comprising the composite pulse bursts and generating feedback data for the control means for pulsewidth control, the beam manipulation means comprising means for optically converting the

fundamental frequency of a percentage of the generated laser pulses to one or more other optical frequencies, the means for converting an optical frequency comprising at least one optical member that converts a portion of the fundamental of the laser pulses into at least one higher order harmonic signal, the at least one optical member device comprising at least one non-linear crystal device with a controller that controls the orientation of the at least one non-linear crystal with respect to the input laser pulses.

122. (previously presented): An end use device for modifying the refractive index of a target substrate, wherein the end device at least comprises an apparatus according to claim 121.

123. (previously presented): An end use device for surface marking, sub-surface marking and surface texturing of a target substrate, wherein the end device at least comprises an apparatus according to claim 121.

124. (previously presented): An end use device for fabricating holes, channels or vias in a target substrate, wherein the end device at least comprises an apparatus according to claim 121.

125. (previously presented): An end use device for the deposition or removal of thin layers of material on a target substrate, wherein the end device comprises an apparatus according to claim 121.

126. (previously presented): An end use device for the joining, welding or fusing of transparent materials, wherein the end device comprises an apparatus according to claim 121.

127. (previously presented): An apparatus for generating optical pulses, wherein each pulse may have individualized characteristics, the apparatus comprising:

laser means, for generating bursts of composite pulses, and for amplifying said composite pulses in a same fiber amplifier gain medium, wherein said laser means is configured

so that each of said pulses are incident on said same fiber laser gain medium and emitted from the same fiber gain medium along a common optical path;

control means that controls the laser means; and

beam manipulation means for monitoring the pulsewidth characteristics of the pulses comprising the composite pulse bursts and generating feedback data for the control means for pulsewidth control, the beam manipulation means comprising means for optically converting the fundamental frequency of a percentage of the generated laser pulses to one or more other optical frequencies, the means for converting an optical frequency further comprising a spectrometer that measures predetermined parameters of pulses output from the non-linear crystal device and generates feedback for the control means.

128. (previously presented): An end use device for modifying the refractive index of a target substrate, wherein the end device at least comprises an apparatus according to claim 127.

129. (previously presented): An end use device for surface marking, sub-surface marking and surface texturing of a target substrate, wherein the end device at least comprises an apparatus according to claim 127.

130. (previously presented): An end use device for fabricating holes, channels or vias in a target substrate, wherein the end device at least comprises an apparatus according to claim 127.

131. (previously presented): An end use device for the deposition or removal of thin layers of material on a target substrate, wherein the end device comprises an apparatus according to claim 127.

132. (previously presented): An end use device for the joining, welding or fusing of transparent materials, wherein the end device comprises an apparatus according to claim 127.

133. (previously presented): An apparatus for generating optical pulses, wherein each pulse may have individualized characteristics, the apparatus comprising:

laser means, for generating bursts of composite pulses, and for amplifying said composite pulses in a same fiber amplifier gain medium, wherein said laser means is configured so that each of said pulses are incident on said same fiber laser gain medium and emitted from the same fiber gain medium along a common optical path;

control means that controls the laser means; and

beam manipulation means for monitoring a variable repetition rate of the composite pulse bursts and generating feedback data for the control means for the variable repetition rate, the beam manipulation means comprising means for optically converting the fundamental frequency of a percentage of the generated laser pulses to one or more other optical frequencies, the means for converting an optical frequency comprising at least one optical member that converts a portion of the fundamental of the laser pulses into at least one higher order harmonic signal, the at least one optical member device comprising at least one non-linear crystal device with a controller that controls the orientation of the at least one non-linear crystal with respect to the input laser pulses.

134. (previously presented): An end use device for modifying the refractive index of a target substrate, wherein the end device at least comprises an apparatus according to claim 133.

135. (previously presented): An end use device for surface marking, sub-surface marking and surface texturing of a target substrate, wherein the end device at least comprises an apparatus according to claim 133.

136. (previously presented): An end use device for fabricating holes, channels or vias in a target substrate, wherein the end device at least comprises an apparatus according to claim 133.

137. (previously presented): An end use device for the deposition or removal of thin layers of material on a target substrate, wherein the end device comprises an apparatus according to claim 133.

138. (previously presented): An end use device for the joining, welding or fusing of transparent materials, wherein the end device comprises an apparatus according to claim 133.

139. (previously presented): An apparatus for generating optical pulses, wherein each pulse may have individualized characteristics, the apparatus comprising:

laser means, for generating bursts of composite pulses, and for amplifying said composite pulses in a same fiber amplifier gain medium, wherein said laser means is configured so that each of said pulses are incident on said same fiber laser gain medium and emitted from the same fiber gain medium along a common optical path;

control means that controls the laser means; and

beam manipulation means for monitoring a variable repetition rate of the composite pulse bursts and generating feedback data for the control means for the variable repetition rate, the beam manipulation means comprising means for optically converting the fundamental frequency of a percentage of the generated laser pulses to one or more other optical frequencies, the means for converting an optical frequency further comprising a spectrometer that measures predetermined parameters of pulses output from the non-linear crystal device and generates feedback for the control means.

140. (previously presented): An end use device for modifying the refractive index of a target substrate, wherein the end use device at least comprises an apparatus according to claim 139.

141. (previously presented): An end use device for surface marking, sub-surface marking and surface texturing of a target substrate, wherein the end device at least comprises an apparatus according to claim 139.

142. (previously presented): An end use device for fabricating holes, channels or vias in a target substrate, wherein the end device at least comprises an apparatus according to claim 139.

143. (previously presented): An end use device for the deposition or removal of thin layers of material on a target substrate, wherein the end device comprises an apparatus according to claim 139.

144. (previously presented): An end use device for the joining, welding or fusing of transparent materials, wherein the end device comprises an apparatus according to claim 139.